

Section 7

Environmental Education

7.1 Overview

The education portion of the SEPP was intended to build awareness of environmental issues among Manchester's youth. The program was to focus on meeting the eighth grade science curriculum framework, and be applicable to other disciplines, while helping students and teachers to investigate the complex issues associated with Manchester's water resources.

7.2 Goals

The 1999 Workplan set forth multiple goals for this program. These included:

- Developing a year-round environmental education program for Manchester eighth grade students;
- Providing workshops and training for teachers in environmental issues;
- Involving students and teachers through in-class projects and field trips; and
- Providing teachers with resources and assistance in the classroom.

"I have a lot more respect for the river... If you were living there you would not want it polluted. I have a lot more respect for the animals living there."

- Parkside Student

These goals were achieved as discussed in the following section.

7.3 Benefits Achieved

A. Developed a year round environmental education program for Manchester eighth grade students



Eighth-grade students from Hillside Middle School sample for macroinvertebrates (insects) in Ray Brook, Manchester. Photo courtesy Amoskeag Fishways.

Merrimack River MATTERS (Manchester's Actions That Totally Enhance River Systems) environmental education curriculum was developed through this project. MATTERS focuses on the Merrimack River Watershed and helps students investigate the complex environmental issues associated with

Manchester's water resources. Through Merrimack River MATTERS, eighth grade students learn about their community through hands-on activities, field trips, and community service projects, and teachers learn about local environmental issues through workshops, training, and in-class speakers.

The Merrimack River MATTERS curriculum was developed through collaboration between the Amoskeag Fishways (Fishways), the Merrimack River Watershed Council (MRWC), and a Teacher Advisory Council (TAC) consisting of a core group of Manchester teachers. Throughout the curriculum development and implementation, the teachers using the curriculum had a great deal of input into its content and final form. The outcome was an

interdisciplinary curriculum designed to emphasize collaboration between teachers of different subjects. Although the curriculum is grounded in science, within each topic area there are activities for the following disciplines: Science, Math, Social Studies, English and Family/Consumer Science. Several options for activities by subject area are provided. A teacher is encouraged to select the most appropriate activities to implement with the class; it is not intended for all activities within a subject area be completed.

B. Provide workshops and training for teachers in environmental issues

Through orientation for the MATTERS curriculum and other workshops and training, a total of 84 teachers were trained under this program.

C. Involve students and teachers through in class projects and field trips

Through implementation of the curriculum, approximately 4000 Manchester students were reached through this program. Activities included:

- In-class hands-on activities, such as building watersheds, human impact and water quality projects, Merrimack River research papers and guest speakers;
- Development of children's books with an environmental theme;
- Water quality monitoring, including monitoring for macroinvertebrates, in local rivers and ponds; and
- Catchbasin stenciling.

D. Provide teachers with resources and assistance in the classroom

Teachers were provided with the MATTERS curriculum, which included activities and lessons to complete in class. Teachers were also provided with kits, including materials for many

curriculum activities. Science teachers were provided with Hach brand surface water testing kits. In addition, MATTERS staff from the Amoskeag Fishways and Merrimack River Watershed Council regularly met with participating teachers to facilitate curriculum implementation and visited classrooms to assist with the lessons and education.



*Southside Middle School teachers display Merrimack River-themed children's books created by their students.
Photo courtesy Amoskeag Fishways.*

7.4 Measurable Results and Long Term Benefits

Staff at the Amoskeag Fishways associated with the Environmental Education portion of the SEPP kept track of certain measures through the life of the project. These measures are given in Table 7-1. In summary,

- Number of students exposed to environmental education through this program: 4,000
- Number of Manchester catchbasins stenciled or decals applied: 450
- Storm water brochures distributed to Manchester residents during stenciling events: 1,300
- Water conservation bumper stickers printed and distributed around Manchester: 500
- Classroom hours spent discussing environmental issues: Classroom hours were

- not recorded.
However, a total of 196 workshop hours were held for teacher training
- Number of teachers trained/qualified as a result of this program to present environmental information to students: 84

School Year	Participating Teams	Workshop Hours	Teachers Trained	Students Reached	Volunteer Hours
1999-2000	N/A (TAC)	26	14 (8 repeat below)	50	100
2000-2001	4	42	16	400	300
2001-2002	8	43.5	24	800	662
2002-2003	12	38.5	19	1200	664
2003-2004	7	30	11	650	738
2004-2005	7	8	6	600	620
2005-2006	3	8	2	300	240
Total	41	196	84	4000	3324¹

Table 7-1

Measures Collected by Amoskeag Fishways Staff

7.5 Leveraged Funding

Leveraged funding included:

- \$10,000 from Stormwater SEPP budget used for catchbasin stenciling and education – *As this is SEPP funds it will not be included in the total for leveraged funding. However, it is an example of “synergy”, the education project was able to effectively use these funds for student and community awareness of local water quality issues.*
- EPA Environmental Education Grant 2001-2002 = \$10,419 (*through Merrimack River Watershed Council, Inc (MWRA)*)

As for this program, the chief benefit of education is the potential for increased concern and stewardship. In this case, the students and teachers should, after the training and activities, understand the importance of their local environment, how they impact it, and things they can do to lessen their impact.

The provided curriculum materials, which meet the current curricula state standards, will continue to serve Manchester teachers indefinitely. The training and assistance received by the teachers will serve them through their career. Examples of curriculum activities are included in Appendix B.

Additional benefits achieved by this program include project and community work completed by the students, natural and cultural areas visited by the students, and exposure to environmental professionals through in-class in and in-field activities. Details of these are listed in Section 7.6, Summary of Other Activities.



Teacher workshops were very “hands on”. Here, teachers sample life in Black Brook. Photo Courtesy Amoskeag Fishways.

¹ The 3324 volunteer hours, including in-class speakers and assistance with field trips and water quality monitoring, is valued at approximately \$60,000.

- Wal Mart Grant 2001 = \$500 for water quality monitoring equipment
- Wal Mart Grant 2002 = \$500 for student project funds (bumper sticker printing)
- Storm water brochure design donated by The Creative Diner = \$950
- Donation of water quality equipment (pH strips) from Hach company = \$96
- Americorps staff time donated to the Fishways = \$3,060
- Volunteer hours as summarized in Table 7-1, including in-class speakers, assistance with field trips, training for students and teachers in water quality monitoring, etc.: \$60,000

Total leveraged funds: \$75,525

The total SEPP funds spent on this task was \$252,100. A total of \$327,625 was spent on environmental education for students and teachers in Manchester as a result of the SEPP, combining direct and leveraged funds.

7.6 Summary of Other Activities and Benefits

Other activities and benefits achieved through this program are summarized below.

1. Projects & Community Service work completed by MATTERS Students

- Water quality monitoring in Piscataquog River, Ray Brook, and Manchester Cedar Swamp Preserve brooks.
- Water quality monitoring at Manchester ponds : Nutts, Dorrs, Stevens, Maxwell, and Pine Island.
- Trail clean up and trail bridge construction at Livingston Park and Manchester Cedar Swamp

- Streambank stabilization/erosion control vegetation planted at Piscataquog River Park

- Salmon fry released as part of USFWS salmon restoration program

2. Students visited the various natural and/or cultural areas as part of the MATTERS programs, including:

In Manchester:

- Piscataquog River, Piscataquog River Park
- Livingston Park, including Dorrs Pond and Ray Brook
- Maxwell Pond, Nutts Pond, Pine Island Pond and Stevens Pond
- Various streams within Manchester Cedar Swamp Preserve; 400 year old Black Gum trees at the preserve
- Amoskeag Fishways Learning and Visitors Center
- Manchester Water Works
- Manchester Wastewater Treatment Plant
- Manchester Historic Association Millyard Museum and Millyard Tour

In the Merrimack River Watershed:

- Mount Uncanoonuc in Goffstown, NH – hiked to hilltop overlook City of Manchester and Merrimack and Piscataquog Rivers
- Mount Major in Alton Bay, NH – hiked to hilltop overlook of Lake Winnepesaukee watershed
- Piscataquog River in New Boston, NH
- US Fish and Wildlife Salmon Hatchery in Nashua, NH

- Lowell Mills and Millyard Museum in Lowell, MA

3. Students were exposed to various Environmental Career Professionals and volunteers and their expertise. In addition to staff from the Amoskeag Fishways and the Merrimack River Watershed Council, the following professionals and volunteers gave some of their time to interact with students either through in-class presentations or by leading student community service activities in the field:

- Americorps NCCC
- Rick Cantu, Manchester Environmental Protection Division (EPD)
- Cynthia Carlson, Water Resources Engineer, CDM
- Nicole Clegg, Project WET Coordinator, NHDES
- Tom Corey, Manchester EPD
- Rich Davis, Resident Project Engineer, CDM
- Art Grindle, Urban Pond Restoration Program Coordinator, Manchester Planning Department
- Krista Helmboldt, Preserve Steward, The Nature Conservancy
- Vic Hyman, Recycling Coordinator, Manchester Highway Department
- Steve Landry, Merrimack Watershed Supervisor, NHDES
- Beth Malcolm, Volunteer River Assessment Program (VRAP) Coordinator, NHDES
- Rob Robinson, Manchester EPD
- Student Conservation Association volunteers
- Various US Fish and Wildlife Service biologists

- Various other Manchester EPD and Highway Department staff members

7.7 Recommendations

The Amoskeag Fishways staff prepared recommendations based on their work in this program. A summary of their recommendations follows.

- To be successful, programs like Merrimack River MATTERS must have in-school support and be an integral part of curriculum or directly relate to curriculum requirements.
- Participation should be on a voluntary basis.
- Program implementation should occur in a clear and consistent manner during the course of the school year.
- Program curricula should include hands-on in-class activities, guest educators and speakers (including professionals in the field) and a service learning component that directly links students to their local community.
- Ongoing professional organization support (and funding for this support) is necessary to sustain such education programs at a successful level.



Hands-on activities help students to absorb information learned in class. Photo courtesy Amoskeag Fishways.